

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A shaped charge for forming a perforation in a subterranean formation, comprising:

a charge case;

an explosive charge;

a liner for retaining the explosive charge within the case, the liner comprising:

~~a first liner membrane;~~

~~a second liner membrane;~~

a cap member forming a leading portion of a jet; and

~~an unconsolidated particulated filler material disposed between the first and second liner membranes~~ forming a particulated portion of the jet.

2. (currently amended) The shaped charge of claim 1 further comprising:

a first liner membrane;

a second liner membrane;

wherein the ~~liner further comprises a metal cap member~~ is disposed upon the first liner membrane and the filler material is disposed between the first and second liner membranes.

3. (Original) The shaped charge of claim 1 wherein the filler comprises powdered metal.

4. (Original) The shaped charge of claim 1 wherein the filler material is a blend of coarse and fine particles.

5. (Original) The shaped charge of claim 1 wherein the first and second liner

membranes are comprised of plastic.

6. (withdrawn) The shaped charge of claim 1 wherein the first and second liner membranes are comprised of polyester.

7. (withdrawn) The shaped charge of claim 1 wherein the first and second liner membranes are comprised of fiberglass.

8. (withdrawn) The shaped charge of claim 1 wherein the first and second liner membranes are comprised of glass.

9. (withdrawn) The shaped charge of claim 3 wherein particles of the powdered metal have a polymer coating.

10. (withdrawn) The shaped charge of claim 9 wherein the powdered metal comprises aluminum and the polymer comprises TEFLON®.

11. (withdrawn) The shaped charge of claim 10 wherein the aluminum is passivated by a polymer coating.

12. (withdrawn) The shaped charge of claim 1 wherein the filler material comprises hollow metal pellets.

13. (withdrawn) The shaped charge of claim 1 wherein the filler material comprises glass balloons.

14. (withdrawn) The shaped charge of claim 1 wherein the filler material comprises nano particles of material from the group consisting essentially of aluminum, copper, tungsten, copper-coated tungsten, and TEFLON®-coated aluminum.

15. (Original) The shaped charge of claim 1 wherein the first and second membranes are contiguously affixed to one another to completely enclose the filler material.

16. (Original) The shaped charge of claim 1 wherein the filler material has a density that is below formation density.

17. (Original) The shaped charge of claim 1 wherein the filler material has a density that is below 2.7 g/cc.

18. (withdrawn) The shaped charge of claim 3 wherein the powdered metal comprises tungsten

19. (withdrawn) The shaped charge of claim 18 wherein the powdered tungsten is coated with copper.

20. (Currently Amended) A shaped charge for forming a perforation in a subterranean formation, comprising:

a charge case adapted to be positioned in a perforating gun;

an explosive charge formed at least partially of an explosive material;

a liner for retaining the explosive charge within the case, the liner upon detonation of

the explosive charge forming a jet having a forward portion and a substantially particulated portion,
the particulated portion having a lower density than the forward portion comprising:

~~a liner membrane; and~~

~~a filler material disposed encapsulated within the liner membrane, the filler material having a density that approximates the density of the formation.~~

21. (currently amended) The shaped charge of claim 20 wherein the particulated portion is formed of a filler material having a density if of the filler material is less than 2.7 g/cc.

22. (currently amended) The shaped charge of claim 20 ~~20~~ 21 wherein the filler material is particulated.

23. (currently amended) The shaped charge of claim 20 ~~20~~ 21 wherein the filler material comprises powdered aluminum.

24. (withdrawn) The shaped charge of claim 23 wherein the filler material further comprises TEFLON®.

25. (Original) The shaped charge of claim 20 wherein the liner has a shape from the group consisting essentially of conical, cylindrical, trumpet, tulip, ball, and hemispherical.

26. (withdrawn) A method of perforating a formation comprising:
generating a perforating jet having a metal precursor portion followed by a substantially particulated portion;
penetrating a wellbore casing with said metal precursor portion;

kissing the formation with said precursor portion; and
penetrating said formation with said particulated jet to form a perforation.

27. (withdrawn) The method of claim 26 further comprising the step of initiating a secondary detonation reaction within the formation to open pores within the formation surrounding the perforation.

28. (withdrawn) The method of claim 27 wherein the step of initiating a secondary detonation reaction comprises heating air-filled pores in unconsolidated aluminum and rapidly oxidizing unconsolidated aluminum via proximity of fluorine atoms in a TEFLON® coating.

29. (withdrawn) The method of claim 26 wherein the secondary burning reaction further comprises oxidizing aluminum through a TEFLON® coating.

30. (withdrawn) The method of claim 26 further comprising the step of disposing unreacted polymer within the formation to reduce fluid viscosity.

31. (withdrawn) The method of claim 26 further comprising the step of disposing unreacted TEFLON® within the formation to reduce fluid viscosity.

32. (Cancelled) An explosively formed penetrator comprising:

a charge case;

an explosive charge within said charge case;

a liner for retaining the explosive charge within the case, the liner comprising:

a substantially contiguous first liner membrane;

a substantially contiguous second liner membrane; and
a particulated filler material disposed between the first and second liner membranes, the filler material being substantially unconsolidated.

33. (currently amended) The shaped charge of claim 20 wherein the explosively formed penetrator further comprises a metal cap disposed upon the first liner membrane.

34. (previously presented) The shaped charge of claim 20 wherein the liner forming a precursor jet is conformal to the charge case.

35. (new) The shaped charge of claim 21 wherein the filler material has a density that approximates the density of an oil bearing formation.

36. (new) The shaped charge of claim 20 wherein the forward portion of the jet penetrates one of (i) a perforating gun scallop, (ii) a perforating gun cover, (iii) a wellbore casing, and (iv) cement sheath.

37. (new) the shaped charge of claim 20 wherein the particulated portion of the jet perforates the subterranean formation.

38. (new) the shaped charge of claim 20 wherein the particulated portion of the jet increases in temperature and reduces interstitial fluid viscosity upon penetration into the subterranean formation.

39. (new) The shaped charge of claim 1 wherein the filler material has a density that approximates the density of an oil bearing formation.

40. (new) The shaped charge of claim 1 wherein the forward portion of the jet penetrates one of (i) a perforating gun scallop, (ii) a perforating gun cover, (iii) a wellbore casing, and (iv) cement sheath.

41. (new) the shaped charge of claim 1 wherein the particulated portion of the jet perforates the subterranean formation.

42. (new) the shaped charge of claim 1 wherein the particulated portion of the jet increases in temperature and reduces interstitial fluid viscosity upon penetration into the subterranean formation.